

# Diaphyseal Fracture of the Humerus during Elective Cesarean Section – A Rare Case Report

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## Learning Point of the Article:

Multidisciplinary team members ought to have watchful eyes and coherence in purview of preventing iatrogenic neonatal fractures.

## Abstract

**Introduction:** Humeral fractures are the second common long bone fractures of the neonatal period after clavicle. Most cases of birth-related humerus fracture are reported during a vaginal breech delivery. The cesarean section does not eliminate the risk of long bone fractures. A humerus fracture is less common but still can happen due to forceful maneuvers like traction during cesarean which can go unnoticed to operating obstetrician or misinterpreted as brachial plexus injury by an inexperienced orthopedic surgeon.

**Case Report:** We received a call from the neonatal intensive care unit (NICU) for a 2-day-old 2.4 kg male baby delivered to primigravida at 37 weeks by elective cesarean for transverse lie, for not moving his right upper limb. On examination by orthopedic surgeon, swelling, contusion, crepitus, and abnormal mobility at the right arm were noticed. Gentle manipulation made the neonate cry. Range of movements (ROMs) of wrist, elbow, and hand were within normal limit without any neurovascular deficit. Hence, the initial diagnosis of brachial plexus injury/Erb's palsy was revised. X-ray of the right upper limb was ordered which showed an isolated mid-shaft humerus bicortical fracture. A high above elbow slab was applied with an arms chest bandage for a week and the baby was discharged with proper advice to the mother to follow-up on the next week.

**Conclusion:** Obstetricians and pediatricians should remain vigilant for the rare occurrence of humerus fracture during cesarean so that they are not missed and managed timely to prevent future disability and deformity.

**Keywords:** Humerus, neonate, long bone, fractures, brachial plexus injury.

## Introduction

Humeral fractures are the second common long bone fractures of the neonatal period after clavicle [1, 2, 3]. Most cases of birth-related humerus fracture are reported during a vaginal breech delivery [4]. However, very rarely such cases have been reported during emergency cesarean for breech presentation. As obstetricians are more vigilant during elective cesarean, to the best of our knowledge, there is no reported case of humerus diaphyseal fracture during an elective cesarean. Herein, we report a unique case of a baby delivered by elective cesarean for the

transverse lie and referred to the orthopedic department with swelling and relative immobility of right arm which was first misinterpreted as birth-related brachial plexus injury but later found to have humerus diaphyseal fracture.

## Case Report

The verbal consent was taken from the parents. We received a call from NICU for a 2-day-old 2.4 kg male baby delivered to primigravida at 37 weeks by elective cesarean for transverse lie for

## Author's Photo Gallery



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**Figure 1:** (a) Plain radiograph of the right humerus showing bicortical diaphyseal humerus fracture. (b) Plain radiograph of the right humerus (1 week after injury) showing soft callus but with angulation and overriding.

not moving his right upper limb. The operating obstetrician revealed difficult extraction of the baby through the lower transverse incision with inverted T extension with the disengagement of the right hand by traction without audible clunk as the hand was stuck in the pelvis. There was no history of metabolic bone disease, osteogenesis imperfecta, diabetes mellitus, and syphilis in parents or family.

The baby cried immediately after birth with an Apgar score of 6 and 7 at 1 and 5 min, respectively. Neonate was kept in NICU for observation. Later, the pediatrician noticed swelling over the right arm with relative immobility and lack of Moro reflex and orthopedic reference was sought. Orthopedic resident examined the neonate and suspected it to be birth-related brachial plexus injury.

On examination by the senior orthopedic surgeon, swelling, contusion, crepitus, and abnormal mobility at the right arm were noticed. Gentle manipulation made the neonate cry. Clavicle, femur, and pelvis were found to be normal. The wrist, elbow, and hand ROM were within normal limit suggesting no nerve injury. There was a good capillary refill and well-felt radial pulse. Rest physical and systemic examinations were normal without any abnormal attitude of waiter's tip hand, so the initial diagnosis of brachial plexus injury/Erb's palsy was revised.

X-ray of the right upper limb was ordered which showed an isolated mid-shaft humerus bicortical fracture, as shown in (Fig.



**Figure 2:** (a) Right arm after 2 months of initial injury showing healed humeral fracture without any deformity. (b) Right arm after 2 months of initial injury showing complete abduction of shoulder with elbow flexion.

1a). Physical examination suggested no distal neurovascular deficit, so no further investigation was done.

A high above elbow slab was applied with an arm chest bandage for a week and the baby was discharged with proper advice to the mother. After 7 days, a check X-ray was done as shown in (Fig. 1b) and the slab was changed to cast for further 2 weeks. At the final visit, no abnormal mobility, crepitus, or tenderness were felt over the fracture site with complete ROM of the shoulder, elbow, and wrist, as shown in (Fig. 2a, b and 3a-c). The final X-ray showed abundant periosteal callus suggesting healing fracture under remodeling, as shown in Fig. 4.

## Discussion

The incidence of birth-related long bone injuries is 0.23–4/1000 live births with humeral fracture incidence as 0.05/1000 live births [4, 5, 6]. Three-fourths of delivery-related long bone fractures occur during vaginal breech deliveries [2, 7]. Birth injuries including long bone fracture are rare but still known complication occurring during cesarean deliveries [8, 9].

The frequency of fetal injury at cesarean delivery varies with the indication for surgery as well as with the duration of skin incision-to-delivery interval and type of uterine incision [10]. Various maneuvers performed during cesarean (particularly



**Figure 3:** (a-c) Complete wrist movements without entrapment of radial nerve in callus.



**Figure 4:** Plain radiograph of the right humerus after 2 months of injury showing healed fracture with undergoing remodeling.

during traction), inadequate incision line, macrosomia, breech presentation, and shoulder dystocia increase the risk of long bone fracture [11].

Although the most frequently affected bone during cesarean delivery is the clavicle, other long bone fractures, such as humerus and femur, are also reported in the literature [12, 13]. Fractures within the 1st week of life without any related factors (rickets, osteogenesis imperfecta, or abuse) or history of trauma suggest delivery complications [13, 14]. In our case, there was no history of trauma or any related factors to cause the humerus fracture. Thus, we considered that fracture was caused by maneuvers performed during cesarean delivery due to malposition of the baby.

Diagnosis of these fractures is generally delayed, due to its rarity. Nearly one-half of patients with birth fractures were diagnosed after a delay of 3–7 days [4, 13]. Clinical findings of birth-related humerus fracture can be confused with dislocation or congenital brachial plexus injury if the practitioner is not experienced [15, 16] as happened during the initial examination in our case. Therefore, any abnormal attitude of adduction and internal rotation of the arm and waiter's tip hand should be inspected keenly before making a clinical diagnosis and ordering relevant investigations.

Humeral fractures of neonates are often greenstick type, although complete fracture with overriding bones may occur. Neonatal humeral fractures can occur in the proximal or distal epiphysis or diaphysis.

Usually, diagnosis of humeral diaphysis fracture can easily be made with X-ray, but diagnosing epiphyseal fractures may require an ultrasound, magnetic resonance imaging, or even arthrography [11]. In this case, the diagnosis was made on X-ray.

Due to proximity to neurovascular structures, humeral fractures can be accompanied by brachial artery, radial, median, and ulnar

nerve injuries, or combined artery nerve injuries [17]. These injuries can be disastrous and change management plan. Our case reported with no neurovascular injury.

Although several techniques have been reported from simple chest bandages, von Rosen splints, U slab, above elbow slab, or cast for the treatment of these fractures, the established treatment method is closed reduction followed by cast immobilization [11, 18].

In postnatal fractures, remodeling is very rapid and effective; humeral fracture rarely fails to heal [11, 19]. It is important to understand that fracture union may look quite unsatisfactory initially, as shown in (Fig. 1b), but 40–50° molding can occur in 2 years, as shown in (Fig. 1c), and parents may be reassured of same [11, 19]. We achieved complete union in our case without any deformity and complication.

### Conclusion

Long bone fractures are among the most unwanted complications of the birth-related injury. Even though the obstetrician is more vigilant during elective cesareans, long bone fracture can still happen during childbirth by elective cesarean. Adequate care is to be taken by operating obstetrician during extraction of child and giving traction on the limb. It is prudent on the part of the operating obstetrician and pediatrician to initiate appropriate investigations and management on the slightest suspicion to prevent future deformities and disabilities.

### Clinical Message

Obstetricians and pediatricians should remain vigilant for the rare occurrence of humerus fracture during cesarean so that they are not missed and managed timely to prevent future disability and deformity.

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